Claims

[c1] 1. A method of making high strength paper or paperboard comprising the steps of:

adding a high modulus filler to an aqueous pulp slurry to form a modified pulp slurry; and

forming the modified pulp slurry into paper or paperboard.

[c2] 2. The method of claim 1 wherein the filler has a modulus of at least 0.1 GPa.

[c3] 3. The method of claim 1 wherein the filler has a modulus of at least 3 GPa.

[c4] 4. The method of claim 2 wherein the filler is selected from the group consisting of polymers, glass fibers, clay nanoplatelets, carbon fibers, silicon carbide fibers and alumina fibers.

[c5] 5. The method of claim 2 wherein the filler has an aspect ratio of at least 50.

[c6] 6. The method of claim 1 wherein a thermosetting resin is also added to the aqueous pulp slurry prior to the forming step.

[c7] 7. The method of claim 6 wherein the resin has a glass transition temperature higher than the service temperature.

[c8] 8. The method of claim 6 wherein the resin has a glass transition temperature of at least 85C.

[c9] 9. The method of claim 6 wherein the resin is selected from the group consisting of melamine, PAE, phenolic resins, phenol-formaldehyde, and anionic and cationic polymers.

[c10] 10. A paperboard made according to the method of claim 2.

[c11] 11. A paperboard made according to the method of claim 3.

[c12] 12. A paperboard made according to the method of claim 7.

[c13] 13. A paperboard made according to the method of claim 8.

[c14] 14. A method of making high strength paper or paperboard comprising the steps of:

coating a filler with a resin matrix;

adding the coated filler to an aqueous pulp slurry to form a modified pulp slurry; and

forming the modified pulp slurry into paper or paperboard.

[c15] 15. The method of claim 14 wherein the filler has a modulus of at least 0.1 GPa.

[c16] 16. The method of claim 14 wherein the filler has a modulus of at least 3 GPa.

[c17] 17. The method of claim 16 wherein the filler is glass fiber.

[c18] 18. The method of claim 14 wherein the resin is hydrophilic.

[c19] 19. A paper or paperboard made according to the method of claim 14.